

2279-79

'Living streams' constructed in laboratory



2282-79

LIVING STREAM—Martin Silver, a graduate student from the University of Tennessee, Knoxville, takes samples of stream organisms from one of eight 65-foot-long channels to which radioisotopes of phosphorus were added.

Research which will aid in the management of stream and river systems is being conducted by ORNL for the National Science Foundation (NSF). The work is being carried out under a \$1.3 million interagency agreement between NSF and the DOE.

The three-year program, titled "Material Spiraling in Stream Ecosystems," was begun in 1978 by the Environmental Sciences Division which has more than 20 years of research experience on the behavior and ecological consequences of radioactive and trace elements released to the environment.

Data useful

"Spiraling" is a term used to describe the reutilization of nutrients by aquatic organisms as the nutrients are transported downstream. Streams are unable to recycle nutrients in place because of the continuous, unidirectional flow of water. However, nutrients released upstream can be reused by aquatic organisms downstream.

The objective of the research is to test the hypothesis that biological mechanisms have evolved in stream ecosystems to enhance the reutilization of nutrients released upstream, and to retard the rate at which the nutrients are transported downstream. Information obtained from the program will enable scientists to determine the ability of streams to recover from the impact of pollutants and aid in understanding factors which regulate the productivity of streams.

'Living' streams

The research is being conducted in a series of field and laboratory experiments using radioactive and stable isotopes as tracers to test the effects of organisms, such as algae, bacteria, fungi, aquatic insects and fish, on nutrient spiraling in streams. Preliminary studies at Walker Branch Watershed, a 250-acre forested landscape located near ORNL, provided information on major mechanisms and pathways of nutrient spiraling, and pinpointed areas of biotic adaptation which required further investigation.

Using data from the field studies, scientists have developed methods for testing the hypothesis about streams in artificial systems that simulate natural conditions. Eight of these "living streams" have been constructed in greenhouses at the Laboratory.

The channels are approximately 65 feet long, 10 inches wide and five inches deep. They can be linked together with module attachments to allow for adjustments in stream length. The streams, which are supplied by water from a nearby well, are slightly sloped to allow for the kind of continuous flow that would exist under natural conditions.

Use of these artificial streams allows the researchers to maintain careful control of the hydrologic inputs and outputs and the aquatic organisms in the system. They are also able to isolate various "pieces" of the nutrient cycle and examine them in detail without disturbing a natural system.

(Please see page 8)

NUCLEAR DIVISION NEWS

a newspaper for employees of the nuclear division • union carbide corporation



Vol. 10/No. 16 August 23, 1979

Secretaries sponsor courses

The Oak Ridge Chapter of the National Secretaries Association is offering study courses during the 1979-80 school year to prepare secretaries to take the Certified Professional Secretary examination. The courses are intended for job and self-improvement as well.

Following is the schedule for the six sections planned:

September 6-October 11 (Thursday): Office Procedures and Administration, Nora Locke, instructor.

October 2-November 11 (Tuesday): Business Law, M. L. Townsend, instructor.

November 7-December 12 (Wednesday): Economics and Management, David C. Krehnke, instructor.

January 3-February 7 (Thursday): Behavioral Science in Business, Mike Willard, instructor.

February 6-April 2 (Wednesday): Accounting, Carl Butcher, instructor.

April 7-April 28 (Monday): Communications and Decision Making, Delorise Barnes, instructor.

All classes meet at the Oak Ridge High School from 6 to 9 p.m. and are limited to 40. Early registration is

encouraged. Deadline for entering the first class is August 27.

Information on schedules and enrollment may be obtained from Vivian J. Zedler, CPS, at extension 4-5524, or at her home, 483-5519.

Labor Day holiday

Monday, September 3, is an official holiday for all Nuclear Division employees, observing Labor Day. No employee is required to be at work unless his/her presence is required by continuous operations or plant protection.

In this issue. . . .

Terry Collins, ORNL Health Physics, hits the heavy iron, demonstrating the powerful art of powerlifting, which he aspires for the Olympics in the future. His story is on pages 4 and 5.

Other features in this issue:

- Page 2Energy advisor
- Page 3Y-12 Promotions
- Page 7Dr. Lincoln
- Page 8About People



3469-79

The energy advisor. . .

Editor's Note: Recently we began a series of energy conservation features which will be alternated with questions from readers to the "Energy Advisor" on conservation-related topics. The articles will be written by staff members about their own experiences or research, with the Energy Division's Merl Baker (alias the Energy Advisor) coordinating the series. Employees with questions or ideas for articles should contact their Nuclear Division News representative listed on the masthead.

QUESTION: Would the savings in home electricity shown in Coutant's article ("Count Kilowatts for Fun, Profit," July 12) be affected greatly by the different weather conditions from year to year? He shows "severe winter" the last two years, and I believe the early 70's were fairly mild.

ANSWER: To be most accurate, energy use and savings should be calculated using "degree days," which provide a measure of the amount of heating (or cooling) required by actual weather conditions. Degree days for heating are calculated by subtracting the average temperature for a particular day from 65°F, the result being the number of degree days for that particular day. If the average temperature is over 65°, the degree days are considered to be zero. The number of degree days for each month is available from the Weather Bureau or the City of Oak Ridge. (For historical data, see article in the August 9 issue of **Nuclear Division News**.)

The degree day base of 65 assumes that the inside air temperature is 70°F, or a difference of 5°F. This difference results from internal heat sources, such as lights and cooking, or external sources such as passive solar; obviously these sources vary. However, if the inside temperature is maintained at 75°F, the Weather Bureau degree days should be increased by about 10 percent; and if at 65°F, decreased by about 10 percent. For example, a house maintained at 80°F in Oak Ridge would require about the same amount of heat as an identical house in Lexington, Ky. or St. Louis maintained at 70°F.

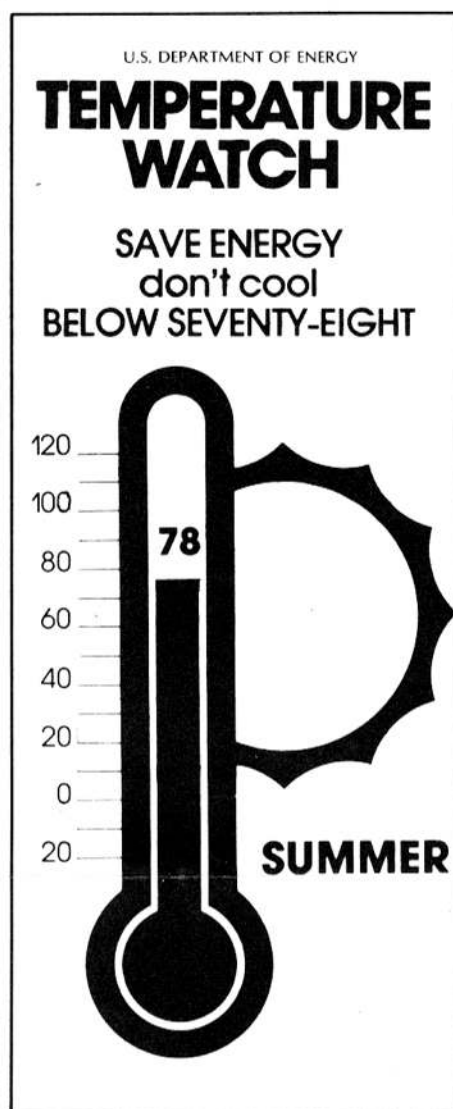
Degree days for Oak Ridge were as follows for two winters at the beginning and end of Coutant's Records:

1970-71	4595
1971-72	4248
1977-78	5434
1978-79	4143

Since the heating degree days were more severe in the later period, his corrected saving would appear to be even more significant than the energy used suggests.

QUESTION: Does it save electricity to turn off an incandescent lamp, radio or TV set when its use is interrupted for just a few minutes?

ANSWER: If the time the TV, lamp or radio would be out of use exceeds 25 minutes, then it is more beneficial to switch it off and save energy. However, if the appliance will be out of use for only a few minutes the difference between the amount of energy required in the on/off cycle and the energy used to maintain power is minimal.



Another factor is the shock effect on the filament or tubes when the appliance is constantly turned on and off. The constant cycling can shorten the life of the appliance.

For fluorescent lights the break-even point, or recommended minimum length of time one should intend to leave them off, is now about 10 minutes. Frequent switching does tend to shorten lamp life and manufacturers rate lamp life according to the length of time left on at each switching. Thus the 10-minute period is a result of weighing the energy required to manufacture and replace lamps against the switching frequency and interval.

anniversaries. . .

Y-12 PLANT

35 YEARS

Bart Slover, Process Maintenance; Charles W. Sweeten, Building Services; Anderson H. Inman, Reproduction Department; and Pauline F. Williams, Plant Laboratory.

25 YEARS

Charles O. Campbell, Kenneth W. Silvers, William R. McCollister, Jimmie D. Snow, Dulan B. Suttles, Furman R. Swanson, Kenneth E. Thomas, James E. Mills, Elizabeth K. Green, Chester Yeary, Sherwood G. Greene and Carl E. Conley.

20 YEARS

Paul A. Evans, Lloyd P. Stevens, Lon T. Nance Jr., and Charles F. Meadors.

ORGDP

35 YEARS

Jasper O. Watson, Utilities Operation; Fred H. Walker, SS Material Handling; Dale A. Robinson, SS Material Handling; David O. Davidson, Utilities Operation; Lyle F. Lieber, Engineering; Richard J. Thomas, Engineering; Burris N. Strunk, Purchasing; Christeen T. Clements, Purchasing; Myrin I. Lundin, Gas Centrifuge; and James W. Barnett, Purchasing.

25 YEARS

Odis R. Chambers.

20 YEARS

William R. Hooks, Evelyn R. Stewart and James T. Huffaker.

ORNL

35 YEARS

Stanley J. Sosnowski Jr., Engineering; James T. Barker, Chemical Technology; Ray C. Hudson, Inspection Engineering; Louis O. Gilpatrick, Chemistry; and Aaron Foust, Finance and Materials.

30 YEARS

John W. Cleland, Solid State; J. C. Grove, Operations; Charles L. Douglass, Finance and Materials; and Dunlap Scott Jr., Engineering Technology.

25 YEARS

Ernest G. Silver, William T. Hazelwood, Ira B. Rubin, Orlan O. Yarbrow Jr., James O. Kolb, Forrest E. Palmer, Kennie W. Boling and Seldon K. Penny.

20 YEARS

Cabell B. Finch, James H. Todd, Charles H. Miller, Kenneth S. Toth, William S. Groenier, Robert R. Laxson, Richard E. Maerker, Peter Mazur, Jesse E. Simpkins Jr., and Glenn R. Haste Jr.

Paducah

35 YEARS

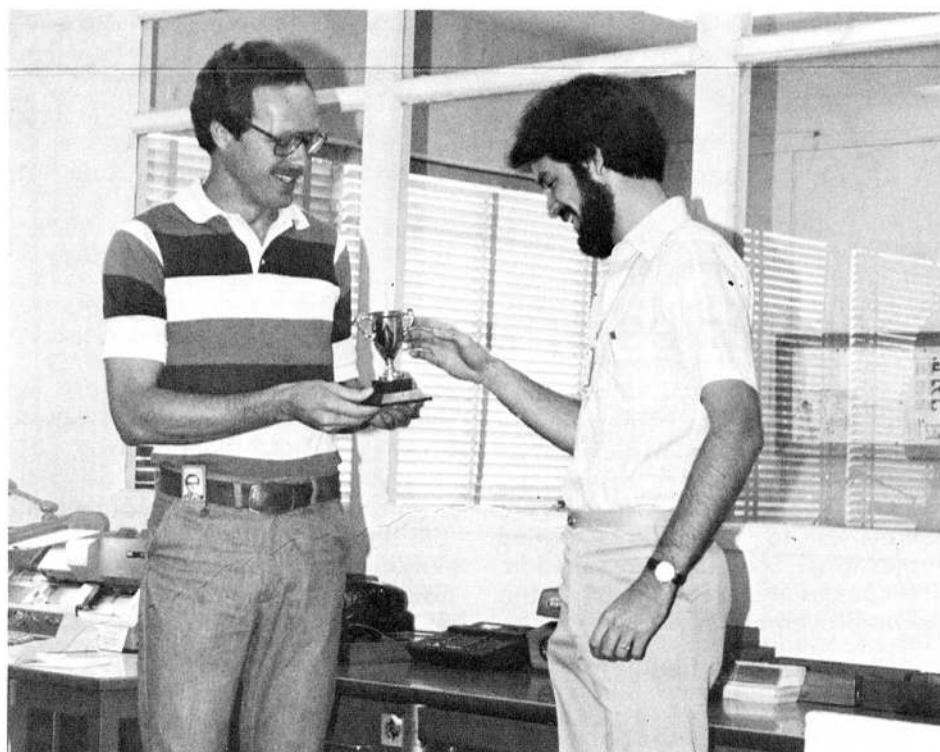
Bruce McDougal, Health Physics; and Al M. Tuholsky, Power, Utilities and Chemicals Division.

30 YEARS

George O. West, Fabrication and Maintenance Division.

25 YEARS

Genevieve B. Warren.



SOUR MOP—In order to call attention to good housekeeping, the Data Services and Timekeeping Department recently presented the "Sour Mop" award to those individuals whose area was a detriment to safe working conditions. Larry Tramell, right, accepts the award from Ralph Garnett. The decision was made by a Paducah housekeeping committee following an unannounced inspection.

NUCLEAR DIVISION NEWS

UNION CARBIDE CORPORATION
NUCLEAR DIVISION

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PADUCAH

Darlene Mazzone, Bell 208

Key West, for shame!

Editor's Note: We don't know our birds; and now Anne Adamson points out we don't know geography too well either. It seems that Key West, Fla. is not the southernmost part of the United States. . .Hawaii is! (See the Blackney article in the **Nuclear Division News**, August 9.)

Key West is roughly on the 24 parallel. . .the southern tip of Oahu on the 22 parallel. Thanks to reader Adamson for catching us in our error. . .and Key West, please change your sign!

Ferguson named in Development

James E. Ferguson has been named superintendent of the Instrumentation and Characterization Department in Y-12's Development Division. The department has res-



James E. Ferguson

pensibilities involving materials characterization, nondestructive evaluation, electronic instrumentation, computer technology and vacuum technology.

Ferguson, a native of Forrest City, Ark., has a BS in mathematics and chemistry from Central University of Arkansas and an MS in inorganic chemistry from the University of Arkansas.

He joined Union Carbide in 1967 and was assigned to the Instrumentation and Characterization Department. In 1976, he was named group leader of the Microanalysis Group, a position he held until his present appointment.

Ferguson and his wife, the former Toni Zackert, live at 602 Woodland Drive, Clinton. They have three children, Laura, Melanie and Walter.

patent granted. . .

To Rosa T. Young and Jagdish Narayan, both of ORNL, for "Method for Forming P-N Junctions and Solar-Cells by Laser-Beam Processing."

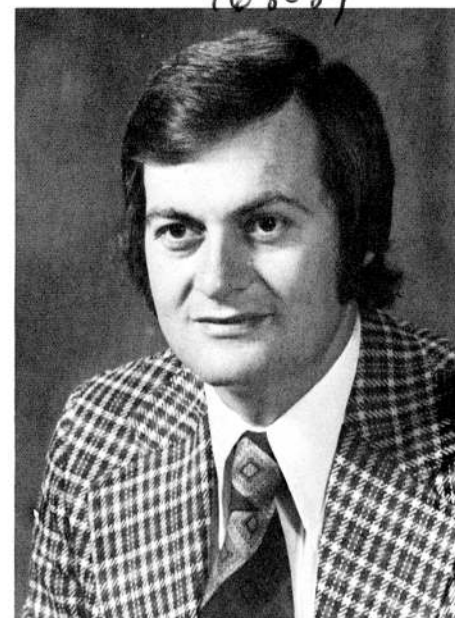
Holland Y-12 quality manager

Charles W. Holland has been named quality manager at the Y-12 Plant, reporting to Jack M. Case, plant manager. The new position has been established to direct the quality organization and advising, coordinating and reporting all other quality-related functions involved with product at Y-12, according to Case.

Holland, a native of Jackson County, Ala., joined Union Carbide in 1962, and was on educational leave between 1965 and 1966. He has a BS degree in mathematics from Lincoln Memorial University; an MS in statistics from Florida State University; and a Ph.D. in management science from the University of Tennessee.

He was formerly head of the Statistical Services Department, and his most recent position was manager of the key personnel development program in the Employee Relations Division.

Married to the former Mary Campbell, he lives at Route 6, Copeland Drive, Powell. The couple



Charles W. Holland

has three children, Angela, Ken and Diana.

Holland serves as a part-time assistant professor of statistics and management science at the University of Tennessee.

United Way in action. . .



UNITED WAY IN ACTION—Dedicated members of the Anderson County Rescue Squad typify United Way activities in our communities. Most of the rescue squads in the area lean heavily on Union Carbide, both for manpower support, and aid through UW monies. From left are Ralph McMillian and Ed Bishop, ORGDP; John D. Hatmaker, recently retired from Y-12, Earnest Braden and Earl Tweed, ORGDP.

question box. . .

If you have questions on company policy, write the editor, **Nuclear Division News** (or telephone your question in, either to the editor, or to your plant contact). Space limitations may require some editing, but pertinent subject matter will not be omitted. Your name will not be used, and you will be given a personal answer if you so desire.

Theft of property

QUESTION: Upon various occasions I have observed employees taking what I believe to be government property from Y-12. What action, if any, would you recommend?

ANSWER: As an employee, you have an obligation to report suspected theft of government property. Any employee observing or having knowledge of unauthorized removal of government property from the installation should immediately notify one of the following: supervision, installation shift superintendent, the installation security department, or the Federal Bureau of Investigation. In the employee handbook, *You at Union Carbide*, the Appendix outlines the criminal penalties imposed by the United States Code, Title 18, Section 641, for the theft or receipt of government property and materials. The assistance of each employee is appreciated because it improves the control of government property.

Vacation timing

QUESTION: I am being asked to take my vacation this year at a time other than when I wanted to take it. When this happens, a vacation really isn't worth much to an employee. Why can't employees take their vacations when they want them?

ANSWER: The large number of vacations due and the necessity of having sufficient personnel present at all times to get the job done, make it necessary for a supervisor to schedule vacations. Unfortunately, this sometimes means that an employee does not get his/her vacation when it is wanted or has to take it at an undesirable time. We try to honor employees' choices to the extent possible. If you have a special problem, discuss it with your supervisor.

Stock dividends

QUESTION: I am buying UCC stock through the Personal Investment Account. What do I have to do, if anything, to get the dividend reinvestment discount that was announced several months ago?

ANSWER: No action is required. Dividends on stock held in the PIA will be reinvested in stock as usual. However, under the new plan, stock purchased with dividend money since September 1, 1978, is acquired at a 5 percent discount from the average market price at the time of the purchase.

Summer Concert

Steve Combs will conduct the Oak Ridge Community Band in a free concert, Monday, September 3. The concert begins at 7:30 at the Performing Arts Pavillion at the Oak Ridge Civic Center. The band will feature marches, Jerome Kern's "Smoke Gets in Your Eyes," and Bucalossi's "Hunting Scene."

The free concerts are sponsored by the Arts Council of Oak Ridge in cooperation with the Nuclear Division of Union Carbide.

Savings Plan-Personal Investment Account

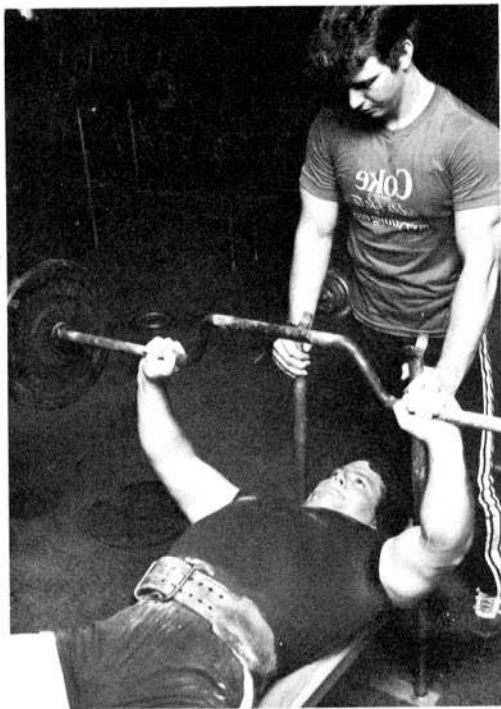
	Fixed Income Fund	UCC Stock	Equity Investment Fund
December 76	13.0553	59.2723	8.8166
December 77	14.2017	40.9096	8.0427
May 79	16.0500	37.1485	8.8840
June 79	16.1669	37.3111	9.2228
July 79	16.2850	38.8933	9.2873

*Dividend reinvestment and stock purchase plan

Note: Fixed Income Fund unit values reflect interest additions to achieve the guaranteed effective annual interest rate of 8.85% for 1978. Union Carbide stock values are the average cost of stock purchased during the month plus brokerage charges. Equity Investment Fund unit values represent the month-end market value of securities held by the Fund. The price of each unit is determined by dividing the total value of the securities by the number of units in the Fund.

Patent granted. . .

To Seth J. Weatley, ORGDP, for "Double-Disc Gate Valve."



A different drummer. . .

'Hulk' pumps iron for competitive lift

by John M. Williams

For some it's a competitive fever, for others, a means of relaxing the tension of a hectic work day. The sport is powerlifting, and Terry Collins, ORNL health physics technician, Industrial Safety and Applied Health Physics Division, has the "fever." Having been forced to give up football, the result of a knee injury, Collins has discovered powerlifting to be an enjoyable way of participating in a competitive sport.

"It's important to distinguish Amateur Athletic Union (AAU)-style powerlifting from Olympic weightlifting, which involves the overhead lifting of the weight. In powerlifting, there are no overhead lifts," said Collins, who has been powerlifting for five years.

Powerlifting has increased in popularity throughout the English-speaking world during the past 15 years and has taken hold in the U.S. and Great Britain since the early 1960's. Perhaps one reason for the sport's rapid popularity gain is that little time has to be spent on technique, as the power lifts are comparatively simple to perform. Strength is the main requirement.

"I lift for competitiveness and for the enjoyment of competitive sports," said Collins, who started in

go up. You have spotters ready to grab the bar and relieve you of the weight in case the lifting attempt fails."

The first lift performed is the squat, in which the lifter places the bar across the back of his neck and shoulders. He does a deep-knee bend and squats until the hip joint is below the height of the knee. The lifter then rises to step forward and replace the bar on the supports. "It has to be a below-parallel squat. The bar cannot roll, and the feet must stay in place. If these rules are violated, the lifter is disqualified," said Collins.

The benchpress, which is the second lift, is done while lying flat on a bench with supports holding the weight. The lifter lowers the bar to the chest and waits from one to three seconds for the judge's clap. This is

Each of the three judges has input on the quality of the lift. A large panel board with lights indicates the score. White signal lights indicate a good lift, while the red lights indicate a poor effort. The lifter must have two out of three white lights for the lift to be complete and counted.

The lifter makes nine individual lifting attempts by the end of the meet: three squats, three benchpresses and three deadlifts. For the total score, the highest weights for each type of lift are added to get the final weight. The highest total determines the winning places in each weight class, first to fifth place.

A platform six to eight inches high is the site of the actual lifting. "I once saw a guy doing a deadlift, and he dropped the 735-pound bar through the platform. This can happen pretty often because of the large amount of weight being lifted.

Collins said he believes that when an individual lifts at a "rate of 50 to 60 percent of his maximum capability," mental and physical preparedness is important. "If you go into a meet physically prepared, but without that mental readiness, you're beaten. Concentration is vital, and it must be 100 percent on that lift," said Collins. One technique used by power lifters seconds before the lift is a slap to the lifter's face. "This technique is to make you want to attack the bar and beat it as you would an enemy," said Collins. Verbal encouragement is also used by the lifter's training partners to keep him "psyched up" during the workout.

In powerlifting, the lifters are distinguished by weight classes. There are 12 weight classes ranging from 114 pounds and below to 275 pounds and above. "Most of the lifters are right on the weight. The heavier you can be in your weight, the better off you are. It gives you a better chance against the others competing in your class. For example, if you weigh 123 pounds in the 114-to-123 pound weight class, the body weight increases your strength. As your body weight begins to go up, so does your lifting strength," said Collins, who weighs 210 pounds in the 198-to-220-pound weight class.

"I had a goal to go over 1200 pounds combined weight. . . I reached that goal, along with winning the meet."

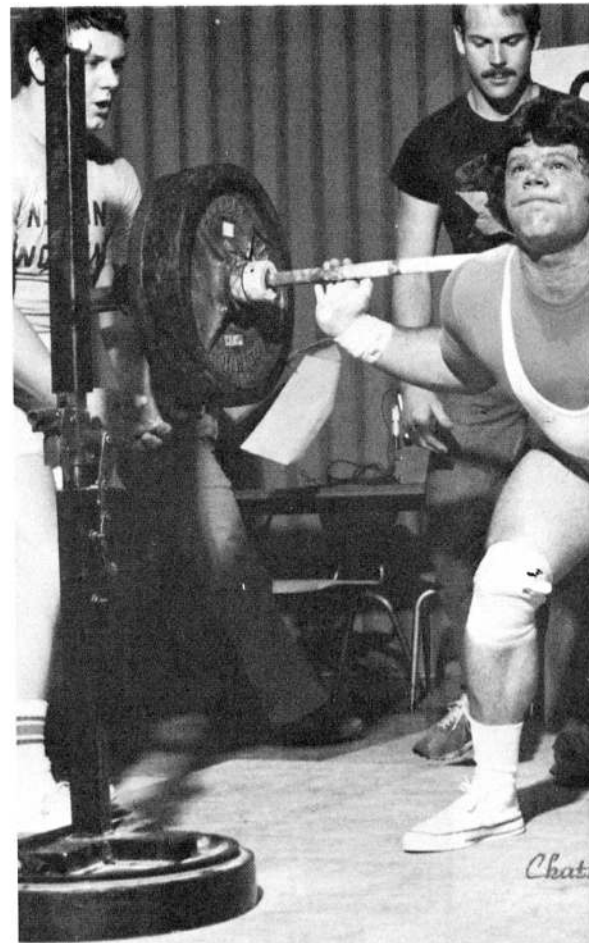
powerlifting competition about two years ago. "The Chattanooga Open, held in May, was the first meet I've won. I had a goal to go over 1200 pounds combined weight of the squat, benchpress and deadlift, and I reached that goal, along with winning the meet." This "competitive drive" is what keeps Collins continually subjecting his body and mind to the rigors of intense training. His current goal is to reach 1400 pounds (combined) by the end of next March.

Collins thinks powerlifting is becoming popular because of the large number of participants and the variety of the lifts performed. In AAU powerlifting, there are three lifts performed in order of proximity: the squat, benchpress and deadlift. Each lift is performed three times with a two-minute time limit for each effort. "Once your name is called, you have two minutes to complete the lift, or disqualification results," he said. "You get three attempts once the weight you plan to lift is announced. The lifter must stay at that weight or

the signal to extend the arms and bar completely. The lifter's hip must be in contact with the bench at all times. When the bar comes off the chest, each arm must be locked out at the same time.

The last lift, called the deadlift, begins with the bar resting flat on the platform. The lifter walks up, grabs the bar with a reverse grip and then he stands until the hips are in a locked, vertical position. The shoulders also have to be in a vertical position in a straight line to the floor. The lift must be a smooth pull without stopping or jerking. This is referred to as "hitching," which is a natural reflex to jerk the bar and stop it above the knee in the mid-thigh area. "The best position in this lift is to have the bar as close to the leg as possible and hold it there, thus keeping it to the center of gravity," said Collins.

The deadlift is the most strenuous of the three lifts. It involves the legs, hips, back and shoulders, but it appears to be the most popular with the audience, because it entails the most weight lifted.



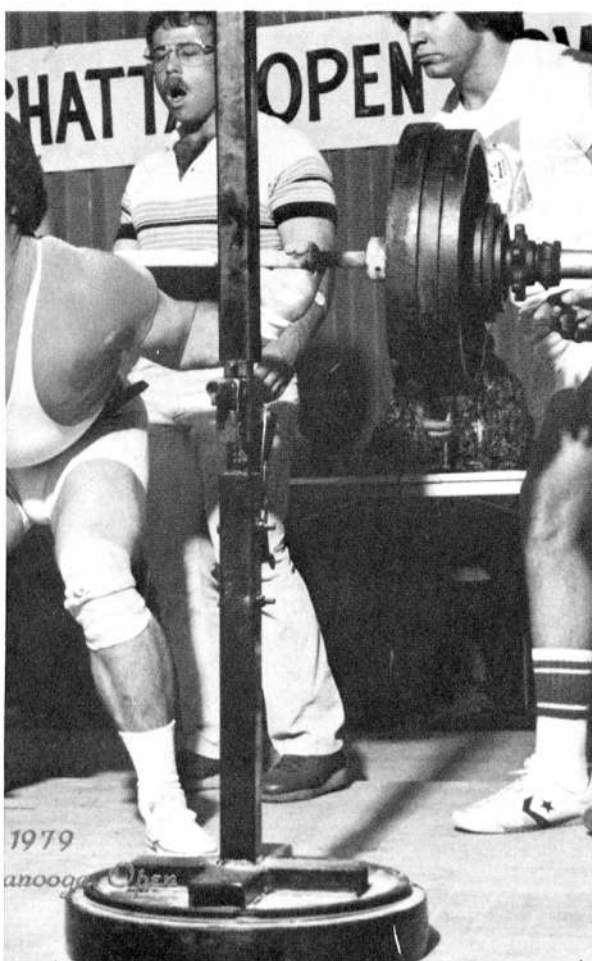
VICTORIOUS: Collins, who lifted 500 pounds at the Chattanooga Open last May.

He says the peak ages of strength capability, for powerlifting are between the years of 30 and 40. "As far as the age factor is concerned," said Collins, "it's possible to continue until you're 50 to 60 years old if you compete on a continuous basis. I know of one powerlifter out West who is 65 years old and still competes."

A special diet is important to the powerlifter training for competition. Collins is on a high-protein diet. "If a meet is five months off, for three of those months I'll go on a high-calorie, high-protein diet which includes bread and potatoes. The reason I want a high calorie intake is to provide myself with enough energy for that training period. Any weight I gain during this period is muscle, not fat," he said. The last two months of the training period, Collins is on a strictly high-protein diet, and the calories are cut down.



GETTING PSYCHED—Collins becomes "prepared" for a lift as he watches his teammates out. He says that concentration must be "100 percent" on that lift.



ids in the squat lift, won first place in the

Collins thinks his "chosen sport" is relatively inexpensive compared to others. Once the initial investment of approximately \$100 is made for necessary equipment and clothing, there's only the \$15 expense of the meet entry fees.

"The official total weight I've been able to lift in competition is 1220 pounds, combined of all three lifts. My body weight at the time was 207 pounds. This was last May. But since that time, my body weight has increased, and I've been able to increase my total weight lifted to 1300 pounds within the last couple of months," said Collins.

"For the squat, I wear a 'slipper-type' shoe with a one quarter-inch rubber sole...why some lifters even wear ballet shoes."

When a powerlifter squats, he wears a tight-fitting outfit called a "super-suit" which tightens the body and helps prevent the body from collapsing after breaking the parallel mark in the squat attempt. A lifting belt is worn to protect the lifter's back. It keeps the vertebrae of the lower back area in line during lifts. Knee wraps add strength to the knee area and are referred to as "super-wraps," which are a special kind of bandage.

The type of shoe worn by the lifters varies with individual preference. "For the squat, I wear a boot with a built-up heel and plain white socks, and for the deadlift, I wear a 'slipper-type' shoe with a one quarter-inch rubber sole. You want a shoe that has no heel, because you won't have as far to pull up on the bar. It puts me as close to the ground as I can get with a shoe on. Why, some lifters even wear ballet shoes," said Collins.

Collins and his wife, Debbie, are still newlyweds, for they have been married only three months. "And she knew what she was getting into long

before marrying me," Collins said. Debbie attends all of her husband's meets. Collins claims that he couldn't do it "if it weren't for her."

Workouts are a five-day-a-week commitment, and the average workout lasts almost four hours. Collins trains Monday through Thursday and on Saturday mornings. He rests on Friday and Sunday. "Debbie holds dinner without any complaints. It's these little things that show she is behind me. My wife's different, for she encourages my lifting. There are times I don't want to go, and she makes me go. All of the wives of the fellows I work out with go to the meets and root for each other. We all do things together on weekends, too. There is a sacrifice of your time during the week though," said Collins.

"Debbie holds dinner without any complaints. It's these little things that show she is behind me."

Despite the satisfaction deriving from powerlifting, lifters like Collins do experience some pitfalls. "My family feared that I would be injured when I lifted, however they are behind me now and live with it. They even attend all the meets," said Collins, who keeps a constant ache in his body that "you get used to." His right shoulder became dislocated in March, but it has since healed.

Collins began lifting when he was 15 years old. His first interest in competitive sports was football, which led to a scholarship at Carson-Newman College. He was forced to give up football after knee surgery.

"When I first came to Oak Ridge, I started working out at Oak Ridge High School, and I made various contacts there. Once I joined a local health club, I became involved with my colleagues. Our 'team' has developed from there," said Collins.

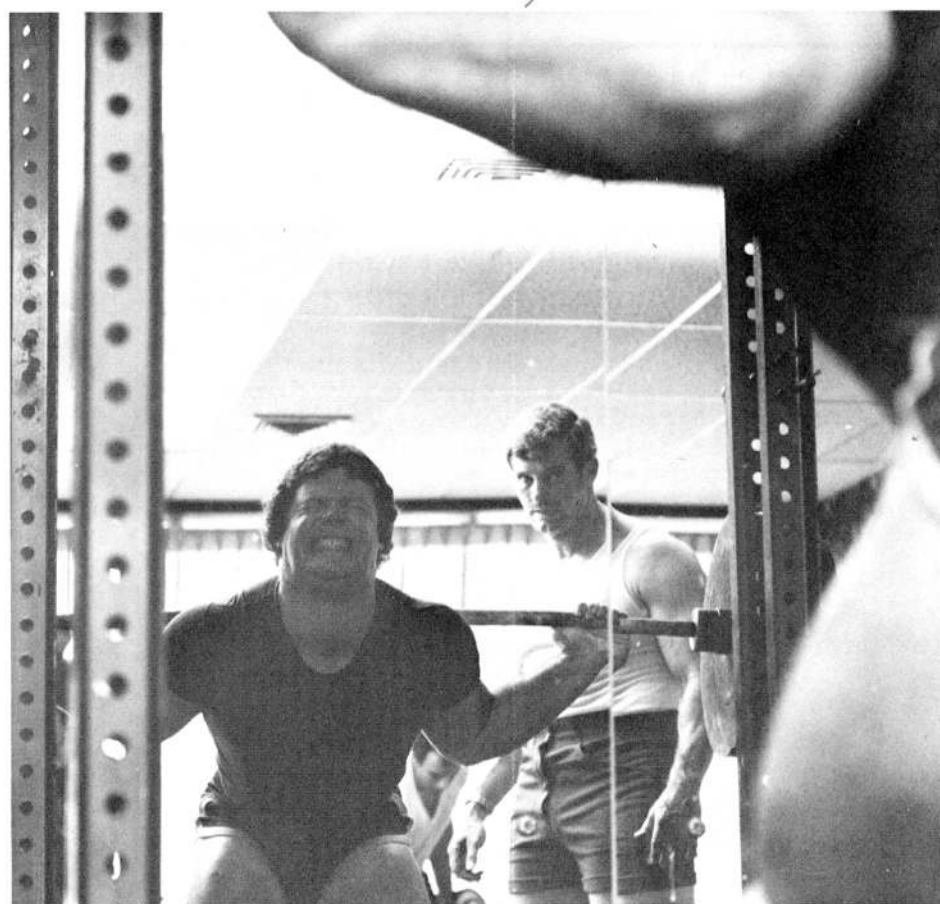
The eight members of Collins' team train at the Nautilus Fitness Center in Oak Ridge. They are among 15 powerlifters currently working out there. "By the time we lift in the state championship in 1980, we plan to have a name for our team, and maybe even uniforms. Up to now, we've been competing as individuals. We're still in the organizational steps, but we'll be lifting on a team basis in January," said Collins.

A member of the Amateur Athletic Union (AAU), Southern Association, Collins has won first place in the 220-pound division at the Chattanooga Open and placed third in the 198-pound division in the Tennessee State Championships in Cleveland, Tenn.

After receiving his A.S. in nuclear engineering, Collins joined Union Carbide in 1976 as a health physics technician at the Transuranium Research Laboratory, ORNL. He and his wife, Debbie, live in Oak Ridge.

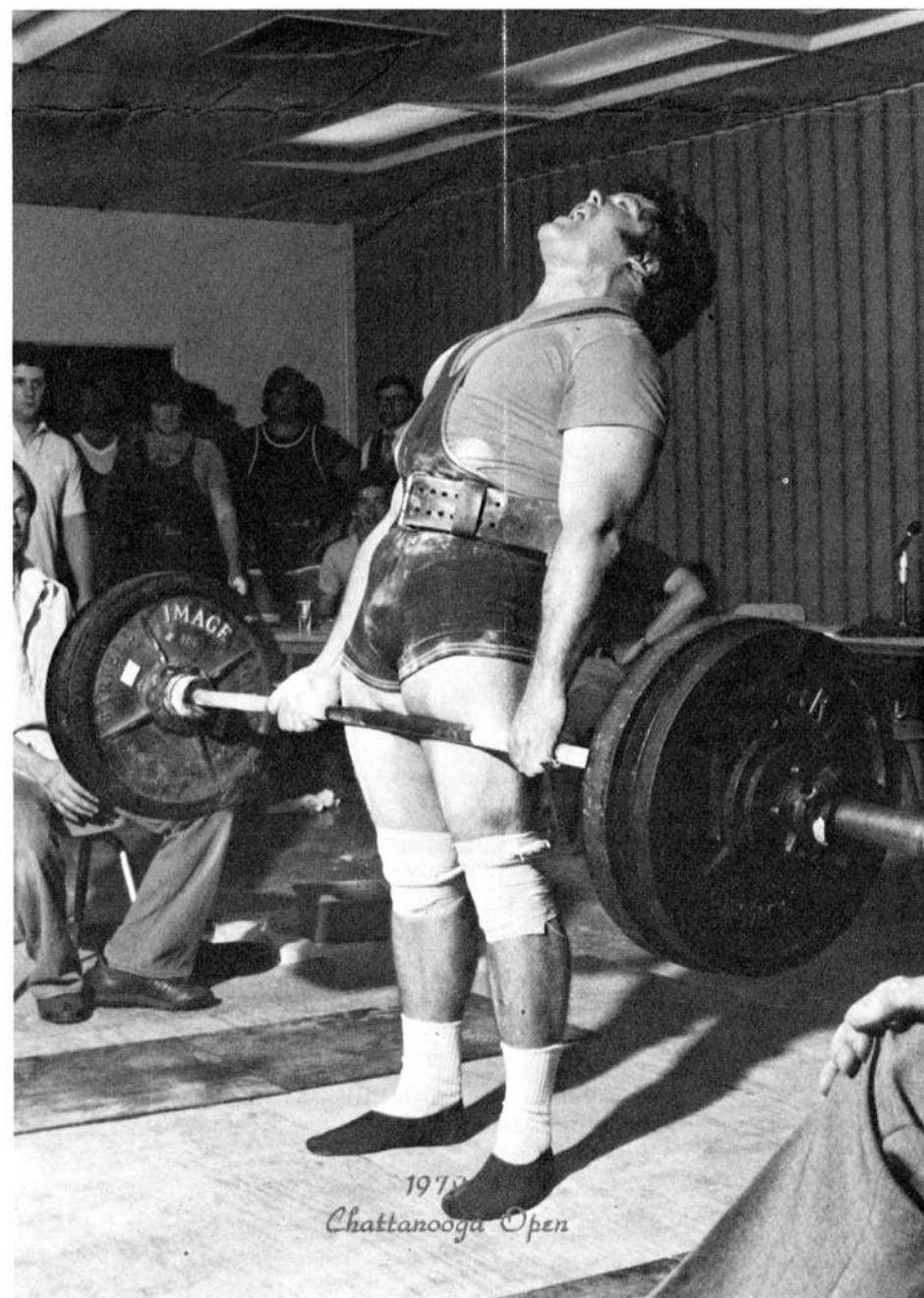
According to Collins, the U.S. dominates the AAU powerlifting sport, winning seven world titles. The AAU World Powerlifting Championships will be held in the U.S. this year, and Collins and his teammates are planning to attend.

Collins thinks powerlifting will eventually become an Olympic sport. "There's always the possibility I might go to the Olympics someday. The world championship is something to shoot for, too," said Collins.



COME ON! Bert Beem, ORGDP Technical Services Division, gives verbal encouragement to Collins during a lift. Bert has been lifting for about five years.

"There's always the possibility I might go to the Olympics someday. The world championship is something to shoot for."



DEADLIFT: The deadlift is considered the most strenuous of the three lifts because it requires the use of almost the entire body. Collins is seen performing the deadlift at the Chattanooga Open.

recreationotes. . .

Bowling leagues. . .

There's bowling in store every week night for Nuclear Division sportsmen. The Recreation Office has details on openings in all leagues. Anyone interested should contact them on extension 4-1597.

Following is a breakdown on league activities:

Night	League	Place	Time
Monday	Y-12 C	Tri-County	5:45
Monday	UCC Mixed	Western Plaza	6:15
Monday	ORNL A	Tri-County	5:45
Tuesday	K-25 Men's	Tri-County	8:00
Tuesday	K-25 Women's	Tri-County	5:45
Wednesday	UCC Mixed	Tri-County	5:45
Wednesday	ORNL Ladies	Ark	5:45
Wednesday	K-25 Men's	Tri-County	5:45
Wednesday	ORNL C	Tri-County	5:45
Thursday	Y-12 Classic	Tri-County	5:45
Friday	Family Mixed	Ark	5:45

safety scoreboard

Time worked without a lost-time accident through August 16:

Y-12 Plant	133 Days	4,388,000 Employee-Hours
ORNL	141 Days	3,362,468 Employee-Hours
ORGDP	247 Days	7,849,533 Employee-Hours
Paducah	84 Days	887,000 Employee-Hours

Fishing Rodeo winners named

The Recreation Department has announced winners in the semi-annual fishing rodeos which closed June 30.

Y-12 PLANT	
Largemouth bass	
H. Y. Rollen	7 lbs. 6 ozs.
L. E. Pate	6 lbs. 1 oz.
J. H. Price	4 lbs. 1 oz.
Smallmouth bass	
R. E. Belcher (wife)	3 lbs. 12 ozs.
Striped bass	
C. E. Hagy Jr.	2 lbs. 4 ozs.
T. L. Crisp (son)	2 lbs. 1 oz.
Sauger	
A. G. Steele Jr.	3 lbs. 13 ozs.
Crappie	
D. L. Pate	2 lbs. 15 ozs.
H. A. Eason	2 lbs. 4 ozs.
E. M. McCullough (retired)	1 lbs. 12 ozs.
Bream	
G. H. Caylor	8 ozs.
Trout	
C. E. Foster	4 lbs. 6 ozs.
E. R. McCullough	1 lb. 1 oz.
Joe Jackson (retired)	8 ozs.
Muskie	
A. D. Leach	15 lbs. 8 ozs.
Rough fish	
H. N. Benninghoff (retired)	15 lbs. 9 ozs.
A. K. Craft	11 lbs. 12 ozs.
George A. West	5 lbs.

Prizes may be picked up at the Recreation Office, Building 9711-5.

ORNL	
Largemouth bass	
J. L. Moore	8 lbs.
J. T. Robinson (son)	6 lbs. 5½ ozs.
V. O. Maggart	4 lbs. 5 ozs.
Smallmouth bass	
E. B. Blair	6 lbs. 4 ozs.
H. M. Johnson	5 lbs. 12 ozs.
W. H. Brooks	2 lbs. 12 ozs.
Striped bass	
W. F. Ohnesorge Jr.	3 lbs.
F. S. Adams (son)	2 lbs. 15 ozs.
L. E. Lebo (retired)	2 lbs. 4 ozs.

Walleye	
B. S. McCown (wife)	5 lbs. 8 ozs.
A. D. Ryon	3 lbs. 14 ozs.
Sauger	
S. O. Smith	3 lbs. 2 ozs.
M. E. Littleton	2 lbs. 15 ozs.
Crappie	
J. T. Byrge	2 lbs. 2 ozs.
J. T. Walker	2 lbs. 1 oz.
D. W. Collins	2 lbs.
Bream	
T. H. Gilliam	12 ozs.
Trout	
P. E. Phillips	2 lbs. 8 ozs.
Rockfish	
W. H. Miller Jr. (son)	32 lbs.
W. J. Lackey	31 lbs. 8 ozs.
Rough fish	
R. G. Quimby Jr. (son)	11 lbs. 5 ozs.

Prizes may be picked up at Room J-1088, Building 4500N.

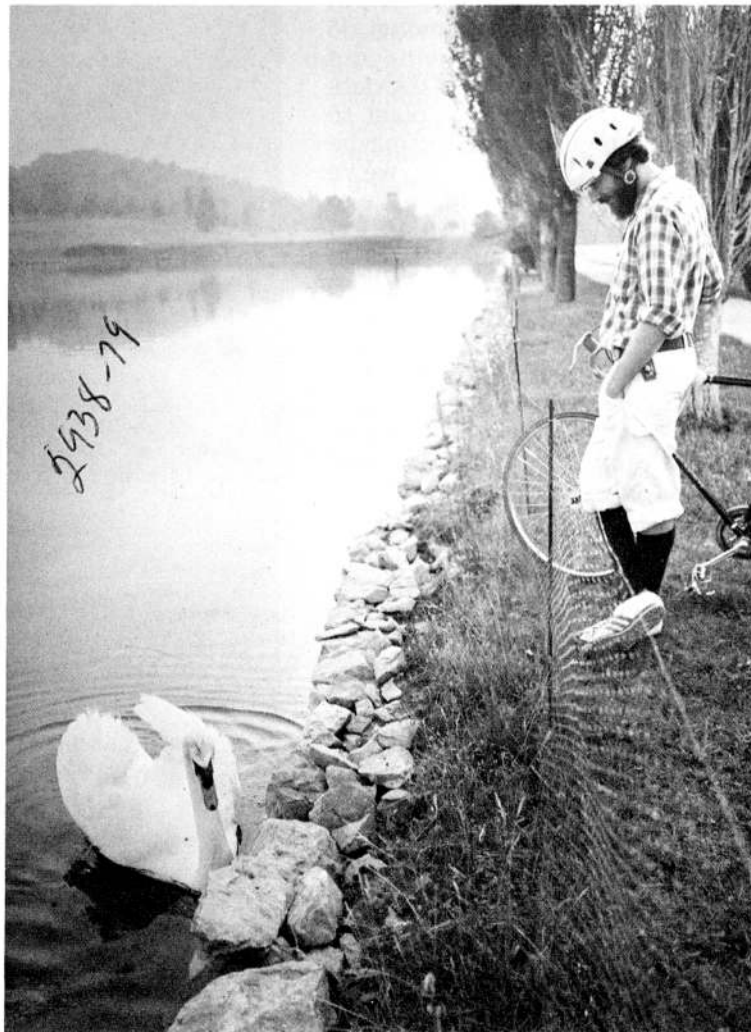
ORGDP	
Largemouth bass	
J. T. Asbury	7 lbs.
J. E. Mayes	6 lbs.
R. G. Hyde (son)	4 lbs. 8 ozs.
Smallmouth bass	
M. J. E. Shelton	4 lbs. 10½ ozs.
N. D. Rathbone (wife)	3 lbs. 12 ozs.
Striped bass	
H. E. Walters (retired)	3 lbs. 4 ozs.
W. M. Cox (son)	2 lbs. 2 ozs.
W. H. Caylor (son)	2 lbs.
Walleye	
W. R. Hartsell (son)	4 lbs. 14 ozs.
W. H. Chambley Jr.	4 lbs.*
B. J. Ford	4 lbs.
*1 inch superior in length	
Crappie	
P. D. Brooks	2 lbs. 4 ozs.
Eli Kimmerly	2 lbs. 1 oz.
J. D. Hart	1 lb. 13 ozs.
Bream	
Larry Hall	1 lb.
W. H. Adams	12 ozs.
R. F. Hyland (wife)	10 ozs.
Trout	
L. B. Parton	4 lbs. 2 ozs.
John May	2 lbs. 2 ozs.
R. T. Beasley	1 lb. 10½ oz.
Rockfish	
E. S. Bishop Jr.	25 lbs. 8 ozs.
Rough fish	
L. C. Patrick	46 lbs. 12 ozs.
R. G. Wilkerson (wife)	33 lbs. 6 ozs.

Prizes may be picked up in Room C-136, Building K-1001.

ORNL Biker gives safety hints



BICYCLE ENTHUSIAST—Bill Huber, research graduate assistant from Columbia University, commutes 20 miles a day round-trip on his bicycle to ORNL from Oak Ridge. Bill, who is working in the Physics Division, has been commuting on bicycle for the past six years. He enjoys the exercise and the scenery during his daily trek that he would miss by other means of transportation. There are problems, however—heavy traffic and broken bottles among the worst. Bill averages one flat about every 70 miles. "I've learned to fix a flat tire pretty quickly by now," Bill exclaimed. Bill would like to pass on some safety tips to other bicycle enthusiasts: 1) Bicycles should be used as vehicles, and riders must obey all traffic regulations; 2) ride on the right, in single file, in a straight line; 3) give pedestrians the right-of-way; 4) obey stop and one-way street signs; and 5) use proper hand signals for turns and stops.



Bowling . . .

UCC Monday . . .

With only a couple of weeks remaining in the Summer League, the UCC Monday Mixed League sees the Good Luck 4 out in front with a substantial six and one-half game lead, over the Four Eagles. The winter league forms August 27. Anyone interested should call Dean Treadway, extension 4-6580.

Summer Family . . .

The Oops team has a two and one-half point lead in the Summer Family Mixed League, rolling past the Turkeys. John Patton and Jennie Saffell hold the season's high handicap games.

Rappelling-Rock climbing

Nuclear Division men and women interested in rappelling and rock climbing should contact J. R. Renfro, Building 9201-1, Y-12, extension 4-3432 . . . or home telephone 376-6701; or Dave Wilson, 376-5919.



CADMIUM

...hidden toxicity

by T. A. Lincoln, M.D.

Cadmium is a toxic metal which has unique problems related to its control within industry. The exposures there can be minimized by special isolation and ventilation of manufacturing processes and limitation of the length of time spent in a contaminated area. Monitoring can be accomplished by special air sampling devices. What can **not** be measured or easily controlled is the exposure which occurs away from work.

Cadmium is a silver-white metal which is soft and malleable with a low melting point. It was identified in 1817 and first used as the yellow pigment, cadmium sulphide. Cadmium plating is used to protect steel products and is a constituent in alloys and low melting-point solders. It is a stabilizer in polyvinyl chloride plastics and is used with nickel hydroxide in the rechargeable nickel-cadmium battery.

Industrial use

In 1969, the industrial consumption of cadmium in the Western world was almost 16,000 metric tons while in 1975 it had dropped to 9,000 metric tons. It is still widely used, and most of the zinc produced and consumed is slightly contaminated with cadmium.

Cadmium is potentially toxic primarily to the lungs, kidneys, liver and bones. The toxicity depends on the type and amount of exposure and the specific chemical and physical characteristics of cadmium compounds.

Cadmium dust or fumes, when inhaled over many years, can lead to chronic obstructive lung disease. During the roasting stage of zinc production, cadmium fumes are most likely to escape to the atmosphere. Whenever cadmium is heated to a high enough temperature, a fume may evolve. Fumes are much more hazardous than the finely divided dust particles which occur during grinding or polishing operations. As will be seen in a moment, it is the generation of a fume which accounts for a major source of non-occupational exposure.

Stored in kidney

The greatest interest by most toxicologists is in the toxicity of cadmium in the kidney. Beginning in childhood, some cadmium is gradually stored in the kidneys. If exposure has been high enough, a body burden gradually accumulates over 20 to 30 years. When approximately 200 micrograms per gram of tissue have been deposited in the cortex of the kidney, damage often occurs.

The normal kidney consists of millions of glomeruli or filters which remove various waste products from the blood. Although it may seem inefficient, much of the material filtered out of the blood is reabsorbed in the convoluted tubules. When these are damaged,

this essential reabsorption process is impaired. Protein, glucose, phosphorus and amino acids may be lost, upsetting the delicate balance of these substances in the body.

When enough cadmium has been accumulated in the tubule cells, they may be injured. The excretion of a special protein called B2 microglobulin is the first sign of injury. Unfortunately, the excretion of this protein is not specific for cadmium toxicity, but it can be used as a reasonably sensitive medical surveillance technique.

Found in nature

Non-occupational sources of cadmium exposure occur to everyone. It is found in many vegetables, especially potatoes, grain products such as cereals, and in seafood. When vegetables or grains are grown in soil enriched with phosphate fertilizers or sewage sludge, they contain much more cadmium. These fertilizers are typically fairly heavily contaminated.

Of special interest is the fact that young women who may have low iron stores because of regular loss of menstrual blood absorb much more cadmium from their intestines than men.

Smoking tobacco is a source of much cadmium exposure. When tobacco burns, the small amount of cadmium contamination it contains is converted to a fume which is easily absorbed. Most autopsy studies of cadmium concentration in the kidneys show that smokers of one or two packages a day have twice as much cadmium in their kidneys as non-smokers.

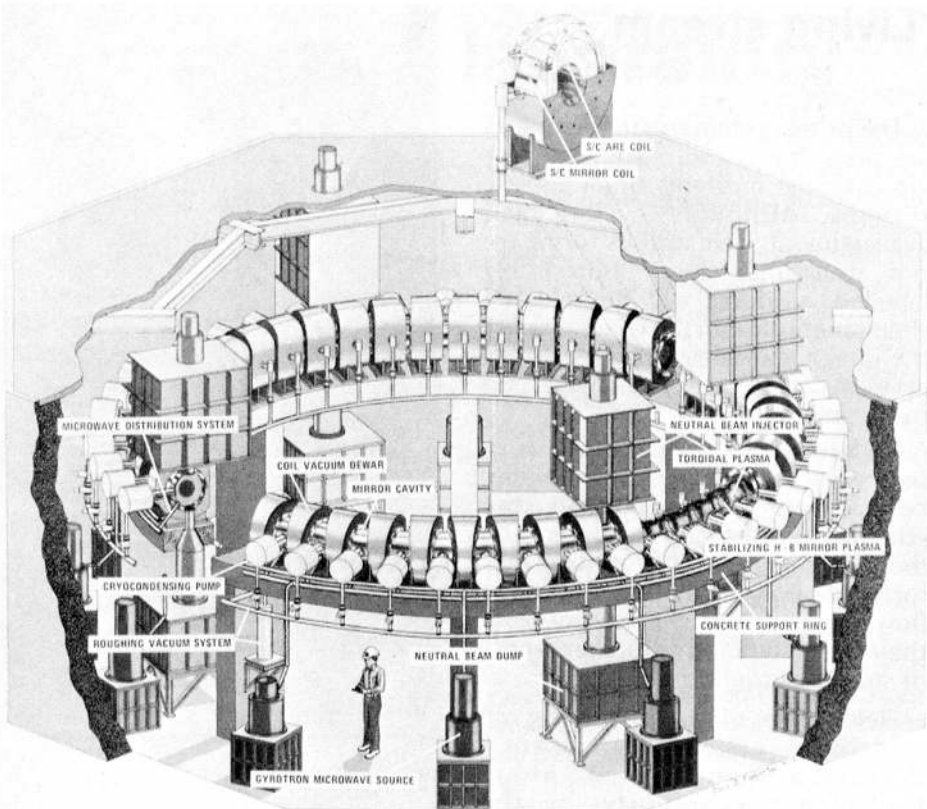
Measure not dependable

So how does one set a standard for occupational exposure to cadmium? Do you make one for the smoker and another one for the non-smoker? Does one try to estimate the dietary intake? Neither of these is practical. Unfortunately, measuring the excretion of cadmium is not entirely dependable because it reflects more the total accumulated body contact than what has recently been taken in through food, smoking or work exposure. Measuring cadmium in the blood is difficult, and it is not a good indicator of the daily intake.

Cadmium's toxicity arises from the total of both occupational and non-occupational sources. How does one sort them out? At this time, no easy way is available. As a consequence, the occupational exposure has to be kept low.

Next issue...

The next issue will be dated September 6. The deadline is August 29.



ELMO BUMPY TORUS P

ARTIST'S CONCEPT—This artist's concept of the ELMO Bumpy Torus Proof of Principle (EBT-P) device, while not a final design, shows its approximate expected size and major features. The EBT-P project, which ORNL is managing for DOE, is currently in the project definition stage.

Studies planned for 'EBT-P'

ORNL has awarded subcontracts in the amount of \$200,000 each to four U.S. corporations for project definition studies as the first step toward the design, construction and operation of a major new fusion energy research device.

Subcontracts have been awarded to Ebasco Services, Inc., New York, N.Y.; Grumman Aerospace Corporation, Bethpage, N.Y.; McDonnell Douglas Astronautics Company, St. Louis Division, St. Louis, Mo.; and Westinghouse Electric Corporation, Fusion Power Systems Department, Pittsburgh, Pa.

Based on EBT device

The device, which will be constructed if present experimental and design activities are successful, is the ELMO Bumpy Torus Proof of Principle (EBT-P) experiment, an enlarged and upgraded version of the ELMO Bumpy Torus (EBT) device that was invented in ORNL's Fusion Energy Division and has been in operation there since 1973. EBT-P, aimed at determining whether the basic scientific principles of the EBT

concept remain promising in a larger scale device, is expected to cost more than \$40 million.

DOE has assigned ORNL overall management responsibility for the EBT-P project and for the technical coordination of the national EBT program.

Reference design planned

In the project definition studies, to be conducted over the next four months, the selected firms will offer their ideas on how the EBT concept should be developed. ORNL will evaluate these studies and consolidate them, along with its own ideas, into a proposed reference design to be used by DOE as the basis for conducting an in-depth review of the project.

Following DOE approval of the final reference design, ORNL will request each of the four participating firms to submit proposals for the actual design, fabrication and installation of EBT-P.

Project manager for the EBT-P is Alfred L. Boch, Fusion Energy Division.

Enjoying the leisure life...



Alvin C. Jenkins
Plant and Equipment
ORNL
25 years service



Johnnie Brown
Employee Relations
ORNL
33 years service



Ray Oldaker
ORGDP
Maintenance
30 years service

'Living stream'

(Continued from page 1)

The primary elements to be studied are phosphorus and nitrogen. These are essential nutrients of all aquatic systems, although cycling and availability of their various forms are not well understood. Isotopically labelled nutrients will be released simultaneously into the channels, and the intake and release by the various stream components will be monitored.

By simulating conditions in a natural stream while maintaining control over its components, the scientists will be able to determine the relative availability of different forms of phosphorus and nitrogen in flowing waters and, thereby, increase their understanding of this key aspect of stream nutrient cycling.

Field studies of stream spiraling will continue at Walker Branch Watershed and at Coweeta Hydrologic Laboratory in the Southern Appalachian Mountains, near Franklin, N.C.

Deliberate pollution

Stream spiraling studies at Coweeta will involve intentionally polluting a natural stream with a pesticide to determine how it will affect the stream's ability to recycle and retain essential nutrients.

Jerry W. Elwood, J. Dennis Newbold and Robert V. O'Neill, ORNL Environmental Sciences Division, are principal investigators for the program. The experiments at Coweeta are being conducted in cooperation with J. Bruce Wallace of the University of Georgia.



wanted...

Y-12 PLANT

CAR POOL MEMBER from Norwood area, Knoxville, to any portal, straight day. S. T. Benton, plant phone 4-1893, home phone Knoxville 687-9496.

VAN POOL MEMBERS (both full-time and fill-in) from Maryville, via Alcoa Highway, with stop at University of Tennessee area, straight day. Joel Horton, plant phone 4-3121, home phone Maryville 983-9160.

ORGDP

RIDERS for van pool from Sweetwater to any portal, 8-4:30. T. J. Allison, plant phone 4-8354, home phone Sweetwater 442-2658.

Open house...

The Separation Systems Division at ORGDP recently had open house at the new facilities, with over 300 employees and members of their families attending. Similar to the "open office concept" of the newly occupied 1580 building, it is a unique structure utilizing space to a maximum. Some of the visitors are seen in the accompanying pictures admiring the interior of the new structure.



wanted...

ORNL

RIDE or JOIN CAR POOL from Marlow area to West Portal, 8:15-4:45 shift. Dick Roop, plant phone 4-7305, home phone 435-1226.

CAR POOL MEMBERS from Kingsgate Subdivision (Co. record area) to East or North Portal, 8-4:30. Nancy Wright, plant phone 4-6273, home phone 966-5228.

CAR POOL MEMBERS from vicinity of West Hills / Crestwood Hills, Knoxville, to depart from Suburban Hills parking lot to East Portal, 8-4:30. E. L. Fair, plant phone 4-5723, home phone 693-3211.

CAR POOL member from Cedar Bluff-Walker Springs area, Knoxville to any portal, 8-4:30 shift. Ginny, plant phone 4-3320, home phone Knoxville 693-4755.

CAR POOL MEMBERS from Landmark subdivision, Cedar Bluff, Walker Springs section, to East, North or West Portals, 8:15-4:45 shift. J. W. Simms, plant phone 4-5926, home phone Knoxville 693-8829.

JOIN or FORM two-three member car pool from Western Plaza area, Knoxville, to East Portal, straight day. Gordon Warner, plant phone 4-5451, home phone Knoxville 546-9763.

VAN POOL RIDERS from Papermill Road exit area to any portal, 8:15-4:45 shift. Ray Pearson, plant phone 4-6849, home phone Knoxville 588-9949.

RIDER FOR VAN POOL from West Knoxville to East, South or West Portal, 8-4:30. Dean Treadway, plant phone 4-6580, home phone 584-4879.

about people...



Beahm

Culpepper

Two ORNL researchers are recipients of an award presented by the Materials Science and Technology Division of the American Nuclear Society for a technical paper making a significant contribution to materials development for the nuclear industry.

Edward C. Beahm of the Chemical Technology Division and Charles A. Culpepper of the Solid State Division were honored for a paper, "Basic Compatibility Studies of Advanced Fuels with 3D Transition Metals," presented at an ANS annual meeting.

Beahm, an ORNL staff member since 1974, is assigned to the Chemical Technology Division's chemical development group. A native of Philadelphia, he is a graduate of Temple University and holds a Ph.D. from Pennsylvania State University.

Culpepper joined ORNL in 1971 and is a staff member of the Isotope Research Materials Laboratory in the Solid State Division. He had previously been employed since 1948 in the Development Division at ORGDP. Culpepper, an Alabama native, attended the University of Tennessee.



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